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BTEC

# Mark Scheme (Results)

## June 2022

Pearson BTEC Nationals
In Sport (31524H)
Unit 1: Anatomy & Physiology

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## Unit 1: Anatomy & Physiology

### General marking guidance

- All learners must receive the same treatment. Examiners must mark the first learner in exactly the same way as they mark the last.
- Mark grids should be applied positively. Learners must be rewarded for what they have shown they can do rather than be penalised for omissions.
- Examiners should mark according to the mark grid, not according to their perception of where the grade boundaries may lie.
- All marks on the mark grid should be used appropriately.
- All the marks on the mark grid are designed to be awarded. Examiners should always award full marks if deserved. Examiners should also be prepared to award zero marks, if the learner's response is not rewardable according to the mark grid.
- Where judgement is required, a mark grid will provide the principles by which marks will be awarded.
- When examiners are in doubt regarding the application of the mark grid to a learner's response, a senior examiner should be consulted.

### Specific marking guidance

The mark grids have been designed to assess learners' work holistically.

Rows in the grids identify the assessment focus/outcome being targeted. When using a mark grid, the 'best fit' approach should be used.

- Examiners should first make a holistic judgement on which band most closely matches the learner's response and place it within that band. Learners will be placed in the band that best describes their answer.
- The mark awarded within the band will be decided based on the quality of the answer in response to the assessment focus/outcome and will be modified according to how securely all bullet points are displayed at that band.

- Marks will be awarded towards the top or bottom of that band depending on how they have evidenced each of the descriptor bullet points.

| Question Number | Answer | Mark |
|---|---|---|
| 1a | Award **one** mark for naming each bone correctly.<br><br>Humerus (1)<br>Ulna (1)<br>Radius (1)<br><br>Accept phonetic spelling. | 3 |

| Question Number | Answer | Mark |
|---|---|---|
| 1 (b) | Award **one** mark for stating a joint that allows the head to rotate.<br><br>• Pivot<br><br>Accept phonetic spelling. | 1 |

| Question Number | Answer | Mark |
|---|---|---|
| 2a | Award **one** mark for stating a type of bone found in the skeleton for a total of **two** marks.<br><br>• Flat (1)<br>• Sesamoid (1)<br>• Irregular (1)<br><br>Accept any other appropriate answer. | 2 |

| Question Number | Answer | Mark |
|---|---|---|
| 2b | Award **one** mark for identifying why long bones and **one** mark for identifying why short bones will help when playing in the match and **one** mark for each linked expansion.<br><br>Long bones enable movement to take place (1) to enable Shantel to move across the goal to make a save (1)<br><br>Short bones absorb the shock/weight bearing (1) reducing the risk of injuries when saving a shot/allows her to push up off the ground to get back up after a save (1)<br><br>Accept any other appropriate answer. | 4 |

| Question Number | Answer | Mark |
|---|---|---|
| 3 | Award up to **three** marks for explaining arthritis.<br><br>Arthritis is when there is an inflammation (in the joint) (1) due to the breakdown/wearing away of cartilage (1) causing pain/stiffness/friction (1)<br><br>Accept any other appropriate answer. | 3 |

| Question Number | Answer | Mark |
|---|---|---|
| 4 | Award **one** mark for labelling each muscle correctly.<br><br>• A – Trapezius (1) (DNA traps)<br>• B – Deltoid (posterior) (1)<br>• C – Latissimus dorsi (1) (DNA lats)<br><br>Accept phonetic spelling.<br>*DNA = Do not accept | 3 |

| Question Number | Answer | Mark |
|---|---|---|
| 5 | Award **one** mark for each type of muscle contraction, up to **three** marks.<br><br>• Concentric/isotonic (1)<br>• Eccentric/isotonic (1)<br>• Isometric (1) | 3 |

| Question Number | Answer | Mark |
|---|---|---|
| 6 | Award up to **two** marks for describing the all or none law.<br><br>• For a motor unit to contract (1) it must receive an impulse/signal (1) all muscle **fibres** must contract/none of the muscles **fibres** contract (1)<br><br>Accept any other appropriate answer. | 2 |

| Question Number | Answer | Mark |
|---|---|---|
| 7 (a) | Award **one** mark for identifying how increased muscle pliability will benefit him and **one** mark for a linked expansion.<br><br>Increase the amount that his muscles can stretch/make him more flexible (1) increase his stride/reduce the risk of injuries (1)<br><br>Accept any other appropriate answer. | 2 |

| Question Number | Answer | Mark |
|---|---|---|
| 7 (b) | Award **one** mark for explaining an increase in myoglobin stores and up to **two** further marks for a linked expansion.<br><br>Enables him to store **more** oxygen in his muscles which will enable him to transport **more** oxygen to the mitochondria (1) have **more** energy/make **more** energy aerobically (1) and run a faster time/fatigue will set in later in the race (1)<br><br>Accept any other appropriate answer. | 3 |

| Question Number | Answer | Mark |
|---|---|---|
| 8 | Award **one** mark for explaining the effects on an endurance athlete from training at altitude for a total of **four** marks.<br><br>• Air is at a lower pressure/less oxygen in air (1) which causes hypoxia/body (1) the respiratory system works harder by increasing breathing rate/shortness of breath (1) this can result in lower capacity to train/reduced performance fatigue quicker/altitude sickness (1)<br><br>Accept any other appropriate answer. | 4 |

| Question Number | Answer | Mark |
|---|---|---|
| 9 | Award **two** marks for describing asthma.<br><br>• Where the airways become restricted (1) making it harder to breathe/wheezing/coughing/shortness of breath (1)<br><br>Accept any other appropriate answer. | 2 |

| Question Number | Answer | Mark |
|---|---|---|
| 10a | Award up to **four** marks for explaining chemical control of breathing enables removal of waste products.<br><br>• Chemoreceptors (1) detect **increased** levels of carbon dioxide/**lower** pH (1) (send messages) to the medulla oblongata (1) therefore this **speeds up/increases** breathing rate (to remove carbon dioxide) (1) | 4 |

| Question number | Indicative content |
|---|---|
| 10(b) | Answers will be credited according to the learner's demonstration of knowledge and understanding of the material, using the indicative content and level descriptors below. The indicative content that follows is not prescriptive. Answers may cover some/all of the indicative content but should be rewarded for other relevant answers.<br><br>**Lung Volumes changes and effects**<br><br>• Her **tidal volume will also increase**, meaning that she will be breathing deeper<br>• **Minute ventilation/pulmonary ventilation will increase**<br>• Respiratory rate x tidal volume = minute ventilation<br>• Her **inspiratory reserve volume/IRV will decrease** meaning that more oxygen can reach the alveoli<br>• Due to this Nancy's **expiratory reserve volume/ERV will decrease** meaning that she can breathe out more carbon dioxide<br>• **residual volume/vital capacity/total lung volume do not change**<br><br>• More oxygen/air taken in, so more oxygen will go to the working muscles/remove more waste products<br>• To prevent the build up lactic acid/sustain aerobic energy production<br><br>**Impact on performance**<br><br>• So that she can work at a higher intensity for longer e.g. can maintain movement around the court/dodging.<br>• The delay of fatigue will come later in the game, (e.g.) so that Nancy can maintain intensity of performance in the 4th quarter.<br><br>Accept any other appropriate answer. |

**Mark scheme (award up to 6 marks)** refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.

| Level | Mark | Descriptor |
|---|---|---|
| Level 0 | 0 | No rewardable material. |
| Level 1 | 1–2 | • Demonstrates isolated elements of knowledge and understanding.<br>• Breaks the situation down into component parts and a few of the points made will be relevant to the context in the question.<br>• Limited analysis which contains generic assertions rather than interrelationships or linkages. |
| Level 2 | 3–4 | • Demonstrates some accurate knowledge and understanding.<br>• Breaks the situation down into component parts and some of the points made will be relevant to the context in the question.<br>• Displays a partially developed analysis which considers some interrelationships or linkages but not always sustained. |
| Level 3 | 5–6 | • Demonstrates mostly accurate knowledge and understanding. |

| | | |
|---|---|---|
| | | • Breaks the situation down into component parts and most of the points made will be relevant to the context in the question.<br>• Displays a developed and logical analysis which clearly considers interrelationships or linkages in a sustained manner. |

| Question Number | Answer | Mark |
|---|---|---|
| 11 | Award **one** mark for naming each structure correctly.<br><br>• A – Pulmonary artery (1)<br>• B – Left atrium (1)<br>• C – Aortic/semi-lunar valve (1)<br>• D – Right ventricle (1) | 4 |

| Question Number | Answer | Mark |
|---|---|---|
| 12 | Award up to **two** marks for describing the function of capillaries.<br><br>Connect arteries and veins/arterioles and venules(1)<br>they provide site for gas exchange (1)<br><br>Accept any other appropriate answer. | 2 |

| Question Number | Answer | Mark |
|---|---|---|
| 13 (a) | Award **two** marks for explaining the impact of increased blood volume and **two** marks for a linked justification.<br><br>Stroke volume/SV is the amount of blood pumped from the heart per beat (1) therefore **more oxygen** is delivered to the working **muscle** (1) therefore enabling Robin to play at a higher intensity for a longer duration (1) and delay the onset of fatigue/recovery quicker between points (1)<br><br>Accept any other appropriate answer. | 4 |

| Question Number | Answer | Mark |
|---|---|---|
| 13 (b) | Award **one** mark for stating the component of blood that would carry most oxygen.<br><br>• Red blood cells/rbc (1) | 1 |

| Question Number | Answer | Mark |
|---|---|---|
| 13 (c) | Answers will be credited according to the learner's demonstration of knowledge and understanding of the material, using the indicative content and level descriptors below. The indicative content that follows is not prescriptive. Answers may cover some/all of the indicative content but should be rewarded for other relevant answers.<br><br>**Functions of the cardiovascular system**<br><br>• **Delivering oxygen and nutrients,** to be transported to Robin's working muscles<br>• Enables an increase in aerobic energy production<br>• **Removing waste products – carbon dioxide and lactate** from the tissue to avoid build up at the muscle<br>• **Thermoregulation** occurs due to vasodilation of blood vessels near to the skin<br>• Which carries blood nearer to the skin's surface, so that excess heat can be lost. This ensures that Robin does not overheat during the game<br><br>**Impact on Performance**<br>• Meaning he can work at higher intensity for longer<br>• Fatigue will occur later<br>• (e.g) he can still run around the court within the game | 6 |

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| Level | Mark | Descriptor |
|---|---|---|
| Level 0 | 0 | No rewardable material. |
| Level 1 | 1–2 | • Demonstrates isolated elements of knowledge and understanding.<br>• Breaks the situation down into component parts and a few of the points made will be relevant to the context in the question.<br>• Limited analysis which contains generic assertions rather than interrelationships or linkages. |
| Level 2 | 3–4 | • Demonstrates some accurate knowledge and understanding.<br>• Breaks the situation down into component parts and some of the points made will be relevant to the context in the question.<br>• Displays a partially developed analysis which considers some interrelationships or linkages but not always sustained. |
| Level 3 | 5–6 | • Demonstrates mostly accurate knowledge and understanding.<br>• Breaks the situation down into component parts and most of the points made will be relevant to the context in the question.<br>• Displays a developed and logical analysis which clearly considers interrelationships or linkages in a sustained manner. |

| Question Number | Answer | Mark |
|---|---|---|
| 14 | Award **one** mark for each process in the correct order.<br><br>• 1 – Aerobic glycolysis (1)<br>• 2 – Krebs cycle/citric acid cycle(1)<br>• 3 – Electron transport chain/ETC (1)<br><br>Accept phonetic spelling. | 3 |

| Question Number | Answer | Mark |
|---|---|---|
| 15 | Award **one** mark for each aerobic adaptation and **one** mark for a linked expansion/justification.<br><br>• Increased storage of glycogen (1) enabling Rhea to keep running at a high intensity in the latter stages of the game/be able to still attack and defend late in the game/delays fatigue (1)<br>• Increased number of mitochondria (1) increases the ability to produce more energy/more aerobic energy production and last the duration of the game (1) | 4 |

| Question Number | Answer | Mark |
|---|---|---|
| 16 | Answers will be credited according to the learner's demonstration of knowledge and understanding of the material, using the indicative content and level descriptors below. The indicative content that follows is not prescriptive. Answers may cover some/all of the indicative content but should be rewarded for other relevant answers.<br><br>**ATP-PC**<br><br>• It fuels activity lasting up to 10 seconds<br>• Used for explosive power/high intensity activity<br>• Phosphocreatine/PC/CP breaks down to release energy, which is transferred to ADP to resynthesize ATP | 6 |

| | | |
|---|---|---|
| | • So Rhea will be able to sprint for a tackle and down the pitch<br>• So Rhea will be able to generate power in her hits<br>• Recovery time is 1:10/10sec-4 mins, so Rhea will run out of energy if she continues to work at this intensity<br><br>**Lactate**<br><br>• It fuels activity lasting 10 seconds – 3 minutes, when the ATP-PC system can no longer do it<br>• It fuels medium/high intensity activity<br>• **Glucose/glycogen/carbohydrates** is broken down to release/yield ATP/energy<br>• Used when doing long sprints (e.g.) a recovery run from a counterattack after sprinting up the pitch<br>• Recovery time is 3mins-2 hours, so Rhea will have to transfer to the aerobic system if she continues to work at this intensity<br><br>**General information**<br><br>• Anaerobic means that it does not require oxygen to produce energy<br>• ATP-PC and lactate systems<br>• Anaerobic activity is high intensity for a short duration | |

**Mark scheme (award up to 6 marks)** refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.

| Level | Mark | Descriptor |
|---|---|---|
| Level 1 | 1–2 | • Demonstrates isolated elements of knowledge and understanding.<br>• Breaks the situation down into component parts and a few of the points made will be relevant to the context in the question.<br>Limited analysis which contains generic assertions rather than interrelationships or linkages. |
| Level 2 | 3–4 | • Demonstrates some accurate knowledge and understanding.<br>• Breaks the situation down into component parts and some of the points made will be relevant to the context in the question.<br>Displays a partially developed analysis which considers some interrelationships or linkages but not always sustained. |
| Level 3 | 5-6 | • Demonstrates mostly accurate knowledge and understanding.<br>• Breaks the situation down into component parts and most of the points made will be relevant to the context in the question.<br>Displays a developed and logical analysis which clearly considers interrelationships or linkages in a sustained manner. |

| Question Number | Answer | Mark |
|---|---|---|
| 17 | Answers will be credited according to the learner's demonstration of knowledge and understanding of the material, using the indicative content and level descriptors below. The indicative content that follows is not prescriptive. Answers may cover some/all of the indicative content but should be rewarded for other relevant answers.<br><br>**Respiratory system adaptations**<br><br>• **Increased vital capacity,** which will enable an increased and more efficient supply of oxygen to his working muscles<br>• **Increased strength of the respiratory muscles**<br>• The diaphragm and intercostal muscles increase in strength, allowing for greater expansion of the chest cavity<br>• Therefore it is easier for him to take deeper breaths<br>• **Increased oxygen and carbon dioxide diffusion rates,** allows oxygen and carbon dioxide to diffuse more rapidly<br>• Thus supplying more oxygen to the working muscles and removing carbon dioxide quicker<br><br>**Muscular system adaptations**<br><br>• **Muscular hypertrophy** increasing his ability to generate more force/power<br>• **Increase in tendon strength,** increasing his ability to generate more force/power<br>• **Increase in the size/number of mitochondria,** which results in the muscles being able to produce more aerobic energy<br>• **Increase in myoglobin stores,** therefore, more oxygenated blood can be transferred to the mitochondria and energy production will be increased<br>• **Increased storage of glycogen**<br>• **Increased storage of fat**<br>• To use as an energy source to fuel him during the swim, when carbohydrates are low/intensity is low<br>• **Increased tolerance to lactate**<br>• Due to an extended capillary network, which enables greater volumes of blood to enter the muscle, more oxygen is available to break down lactic acid, | 8 |

| | | |
|---|---|---|
| | **Impact on performance**<br><br>• (e.g) Helps propel the body forward in the water<br>• (e.g) Performance will be improved and fatigue will be delayed<br>• (e.g) Therefore he will be able to swim at a higher intensity for longer duration<br>• (e.g) Maintain technique<br>• (e.g) Change pace in the race/swim a faster time<br>• Accept any relevant swimming applied points, | |

| **Mark scheme (award up to 8 marks)** refer to the guidance on the cover of this document for how to apply levels-based mark schemes*. | | |
|---|---|---|
| **Level** | **Mark** | **Descriptor** |
| Level 0 | 0 | No rewardable material. |
| Level 1 | 1–3 | • Demonstrates isolated elements of knowledge and understanding.<br>• Breaks the situation down into component parts and a few of the points made will be relevant to the context in the question.<br>• Limited analysis which contains generic assertions rather than interrelationships or linkages. |
| Level 2 | 4-6 | • Demonstrates some accurate knowledge and understanding.<br>• Breaks the situation down into component parts and some of the points made will be relevant to the context in the question.<br>• Displays a partially developed analysis which considers some interrelationships or linkages but not always sustained. |
| Level 3 | 7-8 | • Demonstrates mostly accurate knowledge and understanding.<br>• Breaks the situation down into component parts and most of the points made will be relevant to the context in the question.<br>• Displays a developed and logical analysis which clearly considers interrelationships or linkages in a sustained manner. |

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